

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

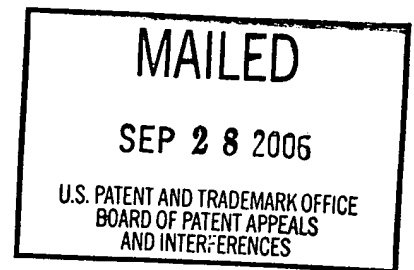
**UNITED STATES PATENT AND TRADEMARK OFFICE**

**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Ex parte STEVEN CURTIS ZICKER, CHADWICK E. DODD  
DENNIS JEWELL, and DALE A. FRITSCH

Appeal No. 2006-2463  
Application No. 10/065,326

ON BRIEF



Before MILLS, GREEN, and LEBOVITZ, Administrative Patent Judges.

MILLS, Administrative Patent Judge.

**VACATUR and REMAND TO THE EXAMINER**

On consideration of the record we find this case is not in condition for a decision on appeal. For the reasons that follow, we vacate<sup>1</sup> the pending rejections and remand the application to the examiner to consider the following issues and to take appropriate action.

Claims 1-7 and 9-11 are on appeal. Claim 8 has been withdrawn from consideration by the examiner.

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<sup>1</sup> Lest there be any misunderstanding, the term "vacate" in this context means to set aside or to void. When the Board vacates an examiner's rejection, the rejection is set aside and no longer exists.

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Claims 1 reads as follows:

1. A method for influencing the behavior of an animal, the method comprising systemically administering to the animal a composition comprising at least about 0.5% by weight of an omega-3 fatty acid or mixture of omega-3 fatty acids as measured on a dry matter basis.

The prior art references cited by the examiner are:

|                              |                  |           |
|------------------------------|------------------|-----------|
| Davenport et al. (Davenport) | WO 2004/006688A1 | Jan. 2004 |
|------------------------------|------------------|-----------|

Grounds of Rejection

Claims 1, 2, 5, 6 and 9-11 stand rejected under 35 U.S.C. § 102(e) over Davenport.

Claims 3, 4 and 7 stand rejected under 35 U.S.C. § 103(a) over Davenport

We vacate these rejections and remand the application to the examiner for consideration of the matters discussed herein.

DISCUSSION

The application is remanded to the examiner for further consideration of the following:

1. The examiner is reminded that the standard under § 102 is one of strict identity. "Under 35 U.S.C. § 102, every limitation of a claim must identically appear in a single prior art reference for it to anticipate the claim." Gechter v. Davidson, 116 F.3d

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1454, 1457, 43 USPQ2d 1030, 1032 (Fed. Cir. 1997). "Every element of the claimed invention must be literally present, arranged as in the claim." Richardson v. Suzuki Motor Co., Ltd., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

It is recommended that the examiner take a step back and reconsider the rejection of the claims for anticipation over Davenport and consider whether a rejection of the claims for obviousness in view of Davenport would be more appropriate. The examiner should determine whether every element of the claimed invention is literally present, arranged as in the pending claim in the disclosure of Davenport, or whether one of ordinary skill in the art is required to engage in some degree of choice among various aspects of different embodiments described in Davenport. If no specific example of administering the claimed composition is found in Davenport, it is recommended that the examiner consider a rejection of all of the claims for obviousness, instead of anticipation.

In addition, the examiner should carefully consider the relevance of Davenport to claim 11 which requires that the omega-3 fatty acids be present in an amount from 1 to about 5%.

2. The examiner should consider the relevance of Ishihara et al., U.S. Patent No. 6,297,280 B1 to the pending claims. Example 2 of Ishihara describes administration of cat food to animals to suppress behavior problems. The example describes administration of a specific food to one of nine cats. Cat "BB" received a

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food containing a DHA powder comprising 5% DHA. See also Example 3, test animals "BBB", "GGG" and "HHH".

In addition, the examiner should carefully interpret the claims to determine whether the claim scope is broad enough to encompass administering an animal food which is not dry but includes a dry component powder of DHA or EPA.

3. The examiner should further consider the relevance of U.S. Patent Publication US2003/0194478 A1 to Davenport et al. to the pending claims. This is a publication of an application filed April 12, 2002, which is prior to the October 3, 2002 filing date of the present application. This Davenport publication describes the administration of combinations of DHA and EPA to animals to influence various animal behaviors. Claim 1 describes administration of a total amount of EPA and DHA of greater than about 0.20 weight percent. The examiner should consider the relevance of this publication, discussing each claim individually.

### CONCLUSION

Accordingly, we vacate the rejections and remand the application to the examiner for further consideration. Upon receipt of the administrative file, we encourage the examiner to take a step back and reconsider the claim scope together with any relevant prior art. The art may be applied alone or in combination. If, after having the opportunity to reconsider the record, the examiner finds that a rejection is


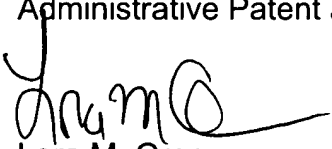
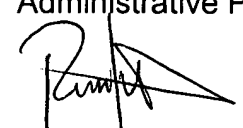
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necessary, the examiner should clearly articulate the basis for any ground of rejection on the record being careful to insure that every limitation of each claim is accounted for.

This remand to the examiner pursuant to 37 CFR § 41.50(a)(1) (effective September 13, 2004, 69 Fed. Reg. 49960 (August 12, 2004), 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)) is **not** made for further consideration of a rejection. Accordingly, 37 CFR § 41.50(a)(2) does not apply.

This application, by virtue of its "special" status, requires an immediate action. MPEP § 708.01(D) (8<sup>th</sup> ed., rev. 1, February 2003). It is important that the Board be informed promptly of any action affecting the appeal in this case.

VACATE AND REMAND

|   |   |                 |
|---|---|-----------------|
|  | ) |                 |
| Demetra J. Mills  | ) |                 |
| Administrative Patent Judge   | ) |                 |
|  | ) |                 |
| Lora M. Green   | ) | BOARD OF PATENT |
| Administrative Patent Judge   | ) | APPEALS AND     |
|  | ) | INTERFERENCES   |
| Richard Lebovitz  | ) |                 |
| Administrative Patent Judge   | ) |                 |

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|                                   |                                       |  |            |
|-----------------------------------|---------------------------------------|--|------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>10/065,326 | Applicant(s)/Patent Under<br>Reexamination<br>Appeal No. 2006-2463 |            |
|                                   | Examiner                              | Art Unit   | Page    of |

**U.S. PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Name             | Classification |
|---|---|--|-----------------|------------------|----------------|
| X | A | US-2003/0194478                                  | 10-2003         | Davenport et al. |                |
| X | B | US-6,297,280                                     | 10-2001         | Ishihara et al.  |                |
|   | C | US-  |                 |                  |                |
|   | D | US-  |                 |                  |                |
|   | E | US-  |                 |                  |                |
|   | F | US-  |                 |                  |                |
|   | G | US-  |                 |                  |                |
|   | H | US-  |                 |                  |                |
|   | I | US-  |                 |                  |                |
|   | J | US-  |                 |                  |                |
|   | K | US-  |                 |                  |                |
|   | L | US-  |                 |                  |                |
|   | M | US-  |                 |                  |                |

**FOREIGN PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country | Name | Classification |
|---|---|--|-----------------|---------|------|----------------|
|   | N |  |                 |         |      |                |
|   | O |  |                 |         |      |                |
|   | P |  |                 |         |      |                |
|   | Q |  |                 |         |      |                |
|   | R |  |                 |         |      |                |
|   | S |  |                 |         |      |                |
|   | T |  |                 |         |      |                |

**NON-PATENT DOCUMENTS**

| * |   | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
|   | U |   |
|   | V |   |
|   | W |   |
|   | X |   |

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



US 20030194478A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2003/0194478 A1**  
**Davenport et al.** (43) **Pub. Date: Oct. 16, 2003**

(54) **DIETARY METHODS FOR CANINE  
PERFORMANCE ENHANCEMENT**

(22) Filed: **Apr. 12, 2002**

**Publication Classification**

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(US); **Eric Karl Altom**, Eaton, OH  
(US); **Allan John Lepine**, Dayton, OH  
(US)

(51) Int. Cl.<sup>7</sup> ..... **A23L 1/00; A61K 47/00**

(52) U.S. Cl. .... **426/601; 426/635; 424/442**

(57) **ABSTRACT**

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(21) Appl. No.: **10/121,325**

A method for increasing the hunt performance of a hunting mammal which includes orally administering to the mammal an effective amount of a diet comprising unsaturated fatty acid eicosapentaenoic acid (EPA), unsaturated fatty acid docosahexaenoic acid (DHA), or both unsaturated fatty acids, in a total amount of the diet greater than about 0.20 weight percent. The invention also provides dietary compositions that yield other beneficial results.



## DIETARY METHODS FOR CANINE PERFORMANCE ENHANCEMENT

### BACKGROUND OF THE INVENTION

[0001] The present invention generally relates to diet based methods for improving the physical performance and cognitive performance of animals, such as endurance, olfactory perception, improved responsiveness to Pavlovian conditioning, alertness, and target detection. More specifically, the present invention provides methods for improved hunt or search performance of sport and task animals, such as hunting dogs and search dogs.

[0002] Many canine food formulations on the market are so-called maintenance diets which are designed and formulated to provide adequate nutrition for the average companion dog on a day-to-day basis. There are also special-purpose diets designed to meet special needs or specific nutritional requirements, such as those encountered in pregnancy, nursing, high stress periods, or growth. A number of scientifically designed special-purpose diet formulas are commercially available which can provide desired outcomes in an animal, for example, growth, maintenance, or high energy. The amount of food an animal requires for maintenance or growth depends upon, for example, age, activity, and environment.

[0003] An important objective of animal owners, trainers, or care givers is to provide their animal with a diet which maintains overall health, well being, appearance, and prevents disease of the animal; all at a reasonable cost. Another objective is to provide a diet which promotes optimum performance in specific tasks, for example, high energy expenditure activities associated with show, sport, or work animals. Performance diets are known in the art and typically contain, for example, about 25-35% by weight protein and 18-22% by weight fat, and can be used mainly for working or show dogs, pregnant or nursing bitches, or animals under stress. However, performance diets are not recommended for all pets, particularly those with a sedentary lifestyle unless food allowances are controlled.

[0004] Hunting with dogs for sport or in competitive events is a popular pastime in the United States and elsewhere around the world. The breed or type of dog that is used varies with the type of game that is hunted, as well as the terrain and distances that are covered. Regardless of these differences, most hunting involves several hours of endurance activity interrupted by short periods of intense running or sprinting. If a dog is hunted often during a season, major nutritional concerns are feeding to promote optimal performance and providing enough calories to maintain body weight and body condition. As a result, nutritional programs for these canine athletes must be designed to provide ample energy and other nutrients to support muscle contraction during athletic events while allowing the dog to benefit from training over the course of the season. Both the immediate needs of the muscle as well as the longer-term concerns such as aerobic capacity, proneness to injury and blood volume must be met with the proper nutritional strategy. (Reinhart, G. A., *Nutrition for Sporting Dogs*. In: *Canine Sports Medicine and Surgery*, Bloomberg, M. S., Dee, J. F., Taylor, R. A., eds., Philadelphia, 1998, W. B. Saunders, pp 349.) The nutrient needs of canine athletes have received increased attention in recent years, resulting in

improved understanding of the changes that are associated with athletic conditioning in this species. The majority of published reports have studied racing greyhounds, endurance sled dogs, or dogs exercising on treadmills in a laboratory setting. (Kronfeld, D. S., Diet and the Performance of Racing Sled Dogs, *J. Am. Vet. Med. Assoc.*, 162:470B473, 1973; Hammel, E. P., et al., Metabolic Responses To Exhaustive Exercise in Racing Sled Dogs Fed Diets Containing Medium, Low and Zero Carbohydrate, *Am. J. Clin. Nutr.*, 1976; 30:409-418; Rose, R. J., et al., Responses to Sprint Exercise in the Greyhound: Effects on Hematology, Serum Biochemistry and Muscle Metabolites, *Res. Vet. Sci.* 1989, 47:212-218; Toll, P. W., et al., The Effect of Dietary Fat and Carbohydrate on Sprint Performance in Racing Greyhound Dogs, In: *Proc 8<sup>th</sup> Internat. Racing Greyhound Symp.* 1992, Gainesville, Fla., pp. 1-3.) Much less is known about the nutritional needs of other types of working dogs. These include, but are not limited to, dogs that are used for hunting, herding, obedience competitions, agility events, and tracking tests, as well as dogs trained to assist the disabled. For each of these categories, the intensity of training and amount of physical work that the dog is required to do can vary considerably. Nevertheless, working dogs typically have increased energy needs compared with the maintenance requirements of normal, adult dogs. An issue is the magnitude of this increase, as well as the best way to supply both energy and other essential nutrients to these working dogs to support maximum performance and well-being.

[0005] Dietary methods for improving mammalian energetic performance are known, reference for example the following patent.

[0006] In U.S. Pat. No. 6,159,942, issued Dec. 12, 2000, to St. Cyr, et al., there is disclosed a method whereby precursors of adenosine triphosphate are administered orally to increase intracellular ATP concentration as dietary supplements or for treatment of reduced energy availability resulting from strenuous physical activity, illness or trauma. Pentose sugars are administered individually, mixed into dry food or in solution. The preferred pentose is D-ribose, singly or combined with creatine, pyruvate, L-carnitine and/or vasodilating agents. Additionally, magnesium, electrolytes, fatty acids and hexose sugars can be used. The compositions and methods of this invention are especially beneficial to mammals having reduced energy availability or high energy demand.

[0007] In U.S. Pat. No. 6,156,355, issued Dec. 5, 2000, to Shields, Jr., et al., there is disclosed breed-specific dog food formulations that comprise chicken meat as the major ingredient, rice as the predominant (or sole) grain source, fruit and/or vegetable fiber as the primary or sole fiber source, unique fat and antioxidant blend, vitamins, herbs and spices, carotenoids, and no corn or artificial colors, preservatives, flavors or sugars.

[0008] Other patents related to the formulation of animal diets include U.S. Pat. Nos. 5,616,569 (fermentable fiber), 5,932,258 (glucose metabolism) and 6,133,323 (beta-carotene).

[0009] The effects of diet on physical performance and olfaction have been noted, see Altom, E., "Effect of Dietary Fat and Physical Conditioning on the Metabolic and Physi-

ological Responses of the Canine Athlete,” Ph.D. Dissertation, Auburn University, Auburn, Ala., 168 pages, Mar. 19, 1999.

[0010] Certain unsaturated fatty acids, such as the essential fatty acids, are known to play a role in, for example, neural development (see Nutritional Reviews, Vol. 59, No. 8, S34, August 2001), retinal composition (see Lipids, Vol. 33, No. 12, 1187, 1998), and inflammation response (see Nutrition, Vol. 16, No. 11/12, 1116, 2000).

[0011] There exists a need for simple, nutritional based methods which enhance muscle and cognitive performance in high activity mammals, that is, mammals that are involved in regular or highly energetic physical activity, for example, a trained dog participating in hunt or search activities. A need also exists for a method to increase the energy level of mammals to provide an increased feeling of well-being, alertness, and lower body temperature during periods of high physical activity and caloric expenditure.

#### SUMMARY OF THE INVENTION

[0012] Applicant has discovered diet based methods for improving the hunt performance or search performance of canines, for example, improved detection of prey animals or search objects, improved endurance, improved metabolism of diet, reduced feeding costs, and improved body temperature regulation during high activity hunt or search periods.

[0013] The present invention provides methods for:

[0014] increasing the hunt or search performance of a hunting or searching mammal which comprises orally administering to the mammal an effective amount of a diet comprising eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), or both, in a total amount of the diet greater than about 0.20 weight percent;

[0015] increasing the heat endurance of a hunting or searching mammal which comprises orally administering to the mammal an effective amount of a diet comprising EPA, DHA, or both, in a total amount of the diet greater than about 0.20 weight percent;

[0016] maintaining the body temperature of a hunting or searching mammal which comprises orally administering to the mammal an effective amount of a diet comprising EPA, DHA, or both, in a total amount of the diet greater than about 0.20 weight percent; and

[0017] increasing the hunt or search performance of an English Pointer dog which comprises orally administering to the dog for an effective time and in an effective amount a diet comprising EPA, DHA, or both, in a total amount of the diet greater than about 0.20 weight percent.

[0018] These and other embodiments are illustrated and exemplified herein.

#### DETAILED DESCRIPTION

[0019] The following definitions are used, unless otherwise described.

[0020] A “target find” or “point” in the context of bird-dog hunting is the number of times the bird-dog pointed to and

indicated the presence of one or more birds in a specific direction or location during a hunt session. A “target find” or “point” in the context of a search animal is, for example, the number of times the search animal pointed to and indicated the presence of one or more target items or search objects in a specific direction or location during a search session.

[0021] “Hunt performance” is the number of target finds per hunt.

[0022] “Overall hunt performance” is a particular animal’s total number of “target finds” or “points” per total hours hunted during a hunting season.

[0023] “Target,” “target item,” or “target object” can mean, for example, a game animal, prey animal, or search object.

[0024] “Search performance” or “detection performance” is the number of target finds per total available targets in a search assignment or detection detail. Thus, for example, a search dog finding 8 of 10 known avalanche victims would have a search performance or detection performance of four-fifths or 80 percent.

[0025] “Search performance,” “detection performance,” and “hunt performance” are to be construed broadly. In the context of the present invention these terms can be synonymous and interchangeable.

[0026] “Game animal” or “prey animal” are both broadly construed and include any animal, living or otherwise, which is a desired object of a hunter or hunt animal, and can include, for example, wild or domestic animals, small game, such as squirrel, rabbit, and the like, or larger game, such as fox, boar, deer, bear, buffalo, and like animals. Other common prey animals include, but are not limited to, ground-dwelling or game birds, such as, grouse, turkey, pheasant, quail, dove, partridge, and water fowl, such as ducks and geese, and other common fowl.

[0027] “Search object” is also construed broadly and can include any living or non-living item, natural or unnatural, which is desired by the searcher or search animal and which search object is to be, for example, discovered, detected, tracked, retrieved, flushed, corralled, and like activities. Examples of search objects include but are not limited to contraband such as narcotics, explosives, herd animals, avalanche or earthquake victims, missing persons, suspects, arrestees, prisoners, prison escapees, trespassers, illegal aliens, terrorists, and the like.

[0028] “Mammal” can include, for example, wild or domestic animals, such as dogs, cats, ferrets, and like animals.

[0029] The terms “include,” “for example,” “such as,” and the like are used illustratively and are not intended to limit the present invention.

[0030] The indefinite articles “a” and “an” mean “at least one” or “one or more” when used in this application, including the claims, unless specifically indicated otherwise.

[0031] The present invention is exemplified by the following comparative study. English Pointers engaged in bird hunting activities while on a Eukanuba® Adult Premium Performance diet were more successful hunters, for example, recording a statistically significantly greater number of finds, and which Pointers required less food to maintain body weight, body condition, and stool consistency

compared with Pointers fed either Purina® Pro Plan Performance or Diamond® diet. Feeding Eukanuba® Adult Premium Performance diet as described and illustrated herein is more economical compared to the Purina® Pro Plan or Diamond® diets based on daily feeding cost or the cost per find.

[0032] The oral administration of the diet can be accomplished, for example, by mouth feeding the mammal a weight maintaining amount of the diet. The oral administration can be accomplished by mouth feeding the diet, for example, from 1 to about 10 servings per day, preferably 1 to about 2 servings per day, and more preferably 1 serving per day. The oral administration of the diet over a period of, for example, from about 1 to about 24 months or longer can produce the desired performance enhancement results and as illustrated herein. The dietary based methods for improved performance of the present invention are particularly applicable where the hunting or searching mammal is a canine, although it will be understood by one skilled in the art that the performance enhancement methods may be applicable to other hunting and working mammals. A particularly preferred canine is an English Pointer breed which is a bird-dog that has been bred, trained, or both, for game bird hunting. The increased hunt performance of the present invention can provide, for example, from about 30 to about 35 percent more target finds, that is for example, points or indications to the presence and location of prey animals per hunt session compared to a above mentioned Purina Pro Plan® chicken and rice diet. The increased hunt performance in embodiments can be about 33 percent more target finds per hunt session over an entire hunting season.

[0033] In a specific embodiment of the present invention the "overall hunt performance" of English Pointer bird-dogs that were fed the Eukanuba® Adult Premium Performance diet increased by greater than about 30 percent compared to similar dogs fed the Diamond® diet. Not only did the Eukanuba® Adult Premium Performance Formula diet increase the "hunt performance" (the number of target finds per hunt) but also improved the "overall hunt performance" of the hunting animal. Thus the "overall hunt performance" (the number of target finds per hunt or total hours hunted summed over an entire hunting season for a particular animal), in this instance quail birds during a hunting season dramatically improved compared to Diamond® formula diet in a carefully controlled blind study and as illustrated herein. Specifically, the method of the present invention increased the overall hunt performance of the hunt animal by about 55 percent compared to the Diamond® formula diet.

[0034] In embodiments of the present invention the target can be, for example, an animal or search object. In other embodiments, the target can be, for example, an upland game bird, a swimming game bird, or a shorebird, such as a quail or a duck.

[0035] In embodiments of the present invention the post-hunt rectal temperature of the canines administered the Eukanuba® Adult Premium Performance Formula diet was from about 0.5 to about 1.2 degrees Fahrenheit lower compared to canines administered the Purina® Pro Plan diet, and preferably the canines administered the Eukanuba® Adult Premium Performance Formula diet have a post-hunt rectal temperature of from about 1.0 to about 1.1 degrees Fahrenheit lower compared to canines administered the

Purina® Pro Plan diet. Thus, the body temperatures of the hunting mammals fed the Eukanuba® diet are maintained to within about 3.0° F. of their pre-hunt body temperatures. The oral administration of the diets of the present invention in hunting or searching canines resulted in superior body condition, superior skin condition, and superior coat condition, during the administration period. The oral administration in hunting canines: maintained consistent body weight during the administration period; resulted in excellent and preferred stool properties; maintained excellent overall health of the canines; maintained normal blood chemistry profiles; and maintained normal food attitudes, for example, maintained normal appetites in hunting dogs as compared to increased appetite, or more commonly, loss of appetite in high activity animals.

[0036] The methods of the present invention provide more efficient and economic food utilization. For example, the Eukanuba® diet used about  $\frac{2}{3}$  of a cup less food each day ( $P < 0.05$ , where P is the probability level) per dog to maintain body weight and body condition during hunting season compared to oral administration of the Purina® Pro Plan diet. The administration Eukanuba® diet was more economical (on a cost per gram fed basis) compared to the Purina® Pro Plan diet, for example, by about \$0.18 less per day per dog which represents about an \$18.00 savings per dog over an entire hunting season. Additionally, on a per "find" annualized basis there was a reduced cost of approximately a \$0.29, that is, a "find" costs about 29 cents less per dog per year for dogs fed the Eukanuba® diet formula versus the Purina® Pro Plan diet formula ( $P < 0.05$ ) arising from or directly attributable to reduced food intake, reduced cost of feeding, and improved find performance.

[0037] In embodiments the present invention provides a dietary composition administered to improve the hunting efficiency of a hunting animal which composition comprises an effective amount of Eukanuba® Adult Premium Performance Formula diet.

[0038] In embodiments the present invention provides a dietary composition administered to improve the energy utilization efficiency in an active mammal which composition comprises an effective amount of Eukanuba® Adult Premium Performance Formula diet.

[0039] In embodiments the present invention provides a dietary composition administered to avoid or prevent heat exhaustion, such as overheating or heat stroke, in an active mammal which composition comprises an effective amount of Eukanuba® Adult Premium Performance Formula diet.

[0040] Introduction An investigation was conducted to study the impact, if any, of diet and nutrition on canine hunt performance. Specifically, the effect of commercial diets on the quail-hunting ability of English Pointers was evaluated at a controlled-access hunting facility. A first year study compared a Eukanuba® formula against a Diamond® formula. A second year study compared a Eukanuba® formula against a Purina® formula.

[0041] Methods The working ability of English Pointers was measured in this study using a practical response criterion (hunting performance). In terms of the number of points or birds found during a hunting session, the dogs fed Eukanuba® performed better than those fed either Diamond® or Pro Plan® diets. Although such assessments are

not easily standardized in a field setting, the two handlers remained blinded to the dietary treatments during both hunting seasons. This control allowed comparisons to be made principally on the dog's hunting success during each season, when the only variation in management was the diet being fed to each group.

[0042] In the first year of this study, 23 adult Pointers were fed Eukanuba® Adult Premium Performance Formula or Diamond® Premium Adult Dog Food, while in year two, 22 Pointers were fed Eukanuba® Adult Premium Performance Formula or Purina® Pro Plan Chicken & Rice Dog Performance Formula. Dogs were initially offered amounts of food calculated to maintain body weight and body condition based on the NRC recommendation for estimating daily metabolizable energy (ME) requirements ( $ME=200 BW^{0.67}$ ), where body weight (BW) is expressed in kilograms and 200 is an activity constant for very active dogs. The handlers were instructed to adjust the food allotment of individual dogs as needed to maintain body weight and body condition during the hunting season. The decision to adjust the food allotment was at the sole discretion of the handler. Food consumption by each dog was measured by the handlers on a regular basis during the study.

[0043] Body weights and subjective stool scores were also obtained on a regular basis during the season. Subjective stool scoring was conducted using a 5-point scale: 1=liquid; 2=soft, no shape; 3=soft with shape; 4=firm (ideal); 5=extremely dry. Body condition and skin and coat health were subjectively evaluated in September, November and March to coincide with the initiation of the training and hunting seasons, and the termination of the hunting season, respectively. The 5-point body condition scoring system consisted of: 1=thin; 2=underweight; 3=ideal; 4=overweight; 5=obese. Skin and coat evaluations included subjective assessments of skin dander and epilation, and coat shedding, shine, uniformity, density and softness. Individuals blinded to the specific dietary assignments conducted the subjective evaluations for body condition and skin and coat health.

[0044] All statistical analyses were conducted using the GLM procedures of SAS. For statistical analysis of body weight, body condition and hunting performance data, the hunting season was divided into six 2-week hunting periods. Total times and duration of hunting, number of finds, and finds per hour were calculated on an individual dog basis for each 2-week period because all dogs were not hunted equally during each period. Despite unequal usage during the hunting season, each dog was allowed to hunt at least one time during each 2-week period. These performance data were subsequently analyzed using a statistical model that included the main effects for diet and hunting period and their interaction. Differences among treatment means were assessed by least-squares mean separation using the PDIFFO option of SAS when the respective F-test for the Type III sums of squares was significant ( $P<0.10$ ). For all variables, arithmetic means and their respective standard deviations are reported for each treatment group.

[0045] Principle ingredients, nutrient content and caloric distribution of each dog food are reported in Tables 1 and 2. Daily care and management of the dogs was provided by two professional handlers employed by the hunt facility. The handlers were blinded to the specific diet each dog received.

[0046]

TABLE 1

| Major dietary ingredients of commercial diets fed to English Pointers during the quail hunting season. |                       |                        |
|--|-----------------------|------------------------|
| Eukanuba® <sup>1</sup>   | Diamond® <sup>2</sup> | Pro Plan® <sup>3</sup> |
| Chicken  | Chicken               | Chicken                |
| Chicken by-product meal  | by-product meal       |                        |
| Corn meal  | Ground corn           | Corn gluten meal       |
| Ground grain sorghum   | Wheat flour           | Brewers rice           |
| Fish meal  | Chicken fat           | Beef tallow            |
| Chicken fat  | Brewers rice          | Ground corn            |
|  | Beet pulp             | Poultry                |
|  |                       | by-product meal        |
| Ground whole grain barley  | Fish meal             | Corn bran              |
| Dried beet pulp  | Egg product           | Animal digest          |
| Natural chicken flavor   | Flaxseed              | Egg product            |
| Dried egg product  | Poultry digest        | Minerals & vitamins    |
| Brewers dried yeast  | Brewers dried yeast   |                        |
| Flax meal  | Minerals & vitamins   |                        |
| Minerals & vitamins  |                       |                        |

<sup>1</sup>The Iams Company, Dayton, OH 45414<sup>2</sup>Diamond Pet Foods, Meta, MO 65058<sup>3</sup>The Ralston Purina Company, St. Louis, MO 63164

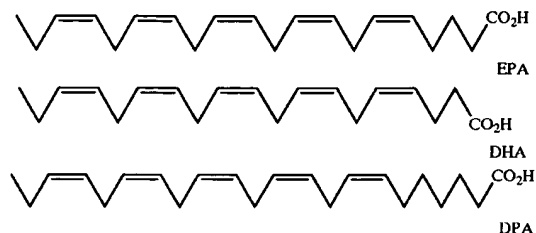
[0047]

TABLE 2

| Nutrient content in weight percent or caloric distribution of commercial diets fed to English Pointers during the quail hunting season. <sup>a</sup> |  |  |                    |
|--|--|--|--------------------|
| Nutrient   | Eukanuba®  | Diamond®   | Pro Plan®          |
| Protein (%)  | 31.2   | 26.1   | 31.9               |
| Fat (%)  | 21.4   | 17.2   | 21.3               |
| Crude fiber (%)  | 2.1  | 3.7  | 2.0                |
| Moisture (%)   | 6.7  | 8.3  | 7.7                |
| Ash (%)  | 6.6  | 6.7  | 5.6                |
| Carbohydrate (%)   | 31.9   | 38.0   | 31.6               |
| Calcium (%)  | 1.19   | 1.50   | 1.30               |
| Phosphorus (%)   | 0.97   | 1.07   | .88                |
| Ca:P   | 1.23   | 1.40   | 1.48               |
| Gross energy (kcal/kg) <sup>b</sup>  | 5,120  | 4,660  | 5,139              |
| Metabolizable energy (ME, kcal/kg) <sup>b</sup>  | 4,220  | 3,899  | 4,224              |
| Protein (% of ME calories) <sup>b</sup>  | 28.1   | 25.4   | 28.7               |
| Fat (% of ME calories) <sup>b</sup>  | 43.1   | 37.6   | 42.9               |
| Carbohydrate (% of ME calories) <sup>b</sup>   | 28.8   | 37.0   | 28.4               |
| Total unsaturated fatty acids (%)  | 14.6   | 11.9   | 13.3               |
| Total omega-3 fatty acids (%)  | 0.55   | 0.50   | 0.15               |
| omega-6:omega-3 fatty acid ratio   | 8:1  | 8:1  | 18:1               |
| Total EPA + DHA (mean %)   | 0.2440   | 0.0274   | 0.0166             |
| EPA:DHA (mean relative ratio)  | 1.052:1.137  | 0.66:1.2   | 0.37:0.44          |
| EPA + DPA + DHA (total weight percent) <sup>c</sup>  | 0.24   | 0.02   | 0.02               |
| Fat Source(s) (label ranking)  | fish meal (5),<br>chicken fat(6),<br>flaxmeal (12) | chicken fat (4),<br>fish meal (5),<br>flaxseed (9) | beef<br>tallow (4) |

<sup>a</sup>Nutrient content was determined by laboratory analyses and are expressed on an as-fed basis.<sup>b</sup>Metabolizable energy content and caloric distribution were calculated using the protein, carbohydrate and fat content and the modified Atwater factors (3.8 kcal/kg; 3.8 kcal/kg; and 8.5 kcal/kg, respectively).<sup>c</sup>EPA = eicosapentaenoic acid (20:5n-3); DHA = docosahexaenoic acid (22:6n-3); DPA = docosapentaenoic acid (22:5n-3).

[0048]



[0049] The above mentioned comparative formulation(s) are all commercially available or may be prepared by procedures known to those in the nutritional arts. Distinguishing aspects between the above Eukanuba® and the Purina® Pro Plan diets follow. The Eukanuba® fat content is chicken-based whereas the Purina® fat content is beef-tallow based. The Eukanuba® protein content is animal-based. The Purina® protein is a combination of animal- and vegetable-based protein. The sources of carbohydrates and omega-3 fatty acids, levels of omega-3 fatty acids, EPA, DPA and DHA, and the ratio omega fatty acids in the Eukanuba® diet are also different from the Purina® diet. Distinguishing aspects between the above Eukanuba® and the Diamond® diets are the protein, fat, and carbohydrate amounts, the carbohydrate source, the levels of EPA, DPA and DHA, and the overall energy content of the diets and as reflected in above tables.

[0050] The source of dietary fat, the ratio of two fatty acids EPA to DHA, and the total weight percentage of two fatty acids EPA plus DHA in the Eukanuba® diet are different from both the above Diamond® and Purina® diets and as indicated in above table. An analysis of at least seven other commercially available performance diets indicated that all had an EPA to DHA ratio (mean 1.41:1.22), and a total weight percentage of EPA plus DHA (mean 0.0374%) which were both considerably lower than the Eukanuba® diet.

[0051] The above mentioned methods of the present invention can be accomplished with diets formulated with, for example, a total fat content of from about 20 to about 28 weight percent, for example, from about 20 to about 25, and from about 20 to about 23 weight percent total fat; where greater than about 70 weight percent of the total fat content is unsaturated fat, for example, containing EPA, DHA, or a mixture of EPA and DHA, in a total amount of the diet of greater than about 0.20 weight percent; preferably where greater than about 75 weight percent of the total fat content is unsaturated fat containing EPA, DHA, or a mixture of EPA and DHA in from about 0.21 to about 0.30 weight percent; and more preferably where greater than about 85 weight percent of the total fat content is unsaturated fat containing EPA, DHA, or a mixture of EPA and DHA in from about 0.22 to about 0.28 weight percent. In embodiments the diet can further comprise, for example, a total protein content of about 30 to about 35 weight percent, and a total carbohydrate content of about 30 to about 35 weight percent. In embodiments the unsaturated fat in the diet is preferably poultry fat such as chicken, fish fat, or mixtures thereof, and more preferably a combination of chicken fat, fish meal, and

flax meal. The diet is preferably free of beef fat, beef protein, or both. The unsaturated fat content of the high fat-high unsaturated fat, performance diets of the present invention preferably includes a mixture of omega-6 fatty acid and omega-3 fatty acid, for example, in a weight ratio of about 5:1 to about 10:1, and more preferably a ratio of about 8:1, for example, as found in the above Eukanuba® diet. A preferred source of omega-3 fatty acid is from, for example, fishmeal, fish oil, and flaxmeal, and more preferably fishmeal or fish oil. A preferred source of the omega-6 fatty acids is from, for example, chicken fat. A preferred type of omega-3 fatty acid is EPA, DPA, or DHA; individually or in combinations.

[0052] All dogs were subjected to the normal training and hunting program of the private hunt facility located in southwest Georgia, including training, conditioning, and hunting segments. In southwest Georgia, the quail-hunting season extends from mid-November through February and is usually preceded by a 2-month period of individual training and physical conditioning. The respective diets were fed exclusively during the training and hunting seasons. The dogs were fed once daily and they did not receive any supplements or treats. The selection of dogs for hunting and the amount of time they were allowed to hunt were based on the discretion of the handlers. The handlers recorded the dates and total time hunted for each dog, number of finds, number of flushes, general attitude of the dog, and reasons for cessation of hunting. Overall hunting performance was calculated for each dog by determining the total number of finds per hunting session and total hours hunted. Licensed veterinarians, who were also blinded to the dietary treatments, collected blood samples and conducted physical examinations at the initiation and termination of the hunting season. Serum and plasma samples were shipped to a commercial diagnostic laboratory (Antec Diagnostic, Inc. Farmingdale, N.Y. 11735) for standard veterinary analysis.

[0053] Because performance in a warm and humid environment is an important consideration for hunting dogs in the southern portion of the United States, a temperature-humidity index (THI) was computed for each day using weather data obtained from a local television station. This index was calculated using the day's high temperature and relative humidity to provide an indication of potential heat stress. (Davenport, G. M., et al., Growth and endocrine responses of cattle to implantation of estradiol-17β during continuous or discontinuous grazing of high- and low-endophyte-infected tall fescue, *J. Anim. Sci.*, 1993, 71:757-764.) Mild, high, and severe levels of heat stress were represented by the values 23.5 to 26, 26.0 to 29.0, and >29.0, respectively.

[0054] Results The results of a two-year study showed that the nutritional management of hunting dogs can have a significant impact on their hunting performance and working ability. (Davenport, G. M., et al., Effect of Diet on Hunting Performance of English Pointers. *Veterinary Therapeutics*, 2001, 2:10-23.) The collective results also show that nutritional management of sporting dogs can significantly impact a dog's performance and working ability. Thus, the nutritional management of canine athletes should provide a balanced diet which: is rich in nutrients required by the dog; meets energy requirements when consumed in acceptable amounts; contains optimum protein and fat levels; has a fatty acid profile that minimizes inflammation, for example, of the

gut, the skin, and the like; allows for repletion (replacement) of muscle glycogen; contains the amount and type of fiber that promotes a healthy gut; is palatable and readily accepted during periods of stress, such as training, hunting or competition; is convenient to prepare and feed; and is stable at normal temperatures to avoid rancidity.

[0055] The results of the year 1 study, comparing Eukanuba with the Diamond® formula, showed that all dogs remained healthy and consumed typical amounts of food throughout the hunting season. Chemical profile and complete blood count (CBC) results were within the normal ranges for adult healthy dogs and showed no major diet-induced changes in the health status of the dogs. Dogs fed Eukanuba® maintained or gained weight and body condition throughout the hunting season, while dogs fed the Diamond® diet lost body weight and condition ( $P < 0.05$ ). As a result, body weight and body condition scores at the end of the hunting season were higher ( $P < 0.05$ ) for dogs fed Eukanuba® compared with the Diamond® diet. No significant differences were observed in fecal stool scores despite a tendency for stools to be slightly softer for dogs fed Diamond®. Dogs fed the Eukanuba® formula demonstrated superior hunting performance ( $P < 0.05$ ) compared with dogs fed the Diamond® formula, based upon total finds per hunt and on the number of birds located per hour of hunting. For the season, dogs fed Eukanuba® had 55% more finds than dogs fed Diamond®, which was equivalent to one more find per hour of hunting. The improved hunting performance of dogs fed Eukanuba® was not due to increased hunting frequency or longer hunting duration, as they were similar for both diet groups throughout the season.

[0056] During the first year (year 1 study), there were 9 days during the hunting season in which the heat index was rated as high or severe based on the temperature-humidity index. On each of these days, the dogs fed Eukanuba® maintained their superior performance over Diamond® based on the number of finds per hour.

[0057] In the second year (year 2 study), all dogs remained healthy based on physical examinations, chemical profiles, and CBC results. As in the year 1 study, there were no diet-induced changes in the health status of the dogs during the hunting season. Similarly, there were no differences in body weight, body condition, or stool scores during the season for dogs fed the Eukanuba® formula versus the Purina® Pro Plan® formula. Despite these similarities, dogs fed Purina® Pro Plan required 11% more food than dogs fed Eukanuba® to maintain body weight and condition. This increased feeding amount was equivalent to about  $\frac{2}{3}$  cup more food per day for each dog (6.4 vs. 5.7 cups/day). There were no differences in the frequency or duration of hunting indicating that dogs on both diets had equal opportunities to hunt during this second season. The performance results showed that dogs fed Eukanuba® had 33% more finds during the season than dogs fed Purina® Pro Plan. Over the entire season dogs fed the Eukanuba® formula averaged 3.0 finds per hunt compared with 2.2 finds per hunt for dogs fed the Purina® Pro Plan formula. Weather conditions during the second year were milder than the previous year (year 1 study). As a result, dogs were not subjected to any significant heat-stressing conditions during the hunting season.

[0058] Discussion Several dietary factors may have influenced the hunting ability and body condition of the dogs

used in the studies. Pointers tend to be a highly active breed and individual dogs do not typically carry additional body fat. Furthermore, these dogs typically lose a considerable amount of body condition as the hunting season progresses. Weight loss, even when moderate, is always comprised of both fat and lean body tissue. (Reinhart, G. A., Nutrition for Sporting Dogs. In: Bloomberg M S, Dee J F, Taylor R A, editors: *Canine Sports Medicine and Surgery*. Philadelphia, 1998, W B Saunders, pp 349; Burgess, N. S., Effect of a very-low-calorie diet on body composition and resting metabolic rate in obese men and women, *J. Amer. Diet. Assoc.* 1991; 91:430-434; Butterwick, F., et al. Changes in the body composition of cats during weight reduction by controlled dietary energy restriction, *Vet. Rec.*, 1996, 138:354-357.) Unfortunately, the loss of lean tissue negatively impacts body condition and stamina which are required for sustained performance.

[0059] The caloric density of a diet may also affect the quantity of food that must be consumed to meet energy requirements. If the metabolizable energy (ME) content of the diet is too low to support increased work, the quantity of food that must be consumed may exceed the physical capacity of the digestive tract. This may lead to increased rate of passage through the digestive tract and decreased nutrient digestibility, further exacerbating an energy deficit. The production of softer stools implies that a diet may be bulk limiting which would ultimately affect energy intake, diet digestibility and nutrient availability.

[0060] Fat is a highly available energy source for the dog and its availability may affect performance during periods of strenuous work. Furthermore, it has been shown that dietary fat can affect body composition of exercising dogs, as lower fat diets result in a loss of lean tissue and body fat compared with higher fat diets that increase lean tissue and body fat. (Altom, E., Ph.D. Dissertation, supra.) The dog is an efficient aerobic athlete that performs best when fed a diet that supplies a large proportion of its energy as fat. (Kronfeld, D. S., Diet and the performance of racing sled dogs, *J. Am. Vet. Med. Assoc.*, 162:470B473, 1973; Reynolds, A. J., Fuhrer, L., Dunlap, et al., Lipid metabolite responses to diet and training in sled dogs, *J. Nutr.*, 1994, 124:2754S-2759S; Reynolds, A. J., et al., Sled dog endurance: A result of high fat diet or selective breeding? *FASEB J* 1995.) Controlled studies using treadmill-exercised dogs have shown that endurance is positively correlated with dietary fat intake and diet digestibility. (Altom, E., Ph.D. Dissertation, supra; Downey R L, et al., Diet of beagles affects stamina, *J. Am. Anim. Hosp. Assoc.*, 1980; 16:273-277.) Furthermore, the source of dietary fat may affect hunting ability based on changes in olfactory function. Previous research has shown that olfactory sensitivity is compromised in dogs fed diets containing a greater percentage of saturated fatty acids. (Altom, E., Ph.D. Dissertation, supra) Therefore, inferior performance of hunting dogs could be attributed to the source of dietary fat used in a commercial formula. Thus, the use of beef tallow in commercial diets could negatively impact olfactory functionality and hunting performance compared with poultry fat and or fish fats because beef tallow contains a higher percentage of saturated fatty acids.

[0061] The improved mammalian hunt or search methods of the present invention are enabled by diets which have a primarily poultry-based fat source, have fish as a source of particular fatty acid compounds, such as EPA and DHA, and

are substantially free of beef tallow as illustrated herein. Thus, the performance enhancing diets used in the present invention have a total fat content of about 20 to about 28 percent with a mixture of saturated and unsaturated fat, and which total fat content has a lower percentage of saturated fat, such as about 23 percent, based on the total weight of the fat component compared to the Purina® Pro Plan diet (about 36 percent saturated fat) and the Diamond® diet (about 30 percent saturated fat).

**[0062]** Effects of Fat and Heat A commonly held belief among dog trainers and breeders is that feeding a high-fat diet to working dogs can predispose them to heat stress during hot weather. However, this belief was not supported by the performance data observed during the year 1 study of the present invention. The increased fat consumed by dogs fed the Eukanuba® diet compared with Diamond® diet did not negatively affect the working ability or stamina of the dogs during periods of heat stress. These results are also supported by previous research showing that a reduced fat diet produced higher rectal temperatures in dogs after one hour of treadmill exercise compared with a high fat diet. (Altom, E., Ph.D. Dissertation, supra.) Therefore, a high fat diet may be more beneficial to a working dog during periods of hot weather based on its ability to reduce core body temperature.

**[0063]** Protein Dietary protein is also an important consideration for canine athletes. Current evidence indicates that aerobic training imposes an increased need for dietary protein in dogs. (Hammel, E. P., et al., Metabolic responses to exhaustive exercise in racing sled dogs fed diets containing medium, low and zero carbohydrate, *Am. J. Clin. Nutr.*, 1976; 30:409-418; Adkins, T. O., et al., Diet of racing sled dogs affects erythrocyte depression by stress, *Can. Vet. J.*, 1982; 23:260-263.) In all animals, athletic conditioning results in adaptive physiological changes that facilitate efficient delivery of oxygen and nutrients to working muscles. These changes include increases in blood volume, red blood cell mass, capillary density, mitochondrial volume, and in the activity and total mass of metabolic enzymes. (Kronfeld, D. S., et al., Hematological and metabolic responses to training in racing sled dogs fed diets containing medium, low, or zero carbohydrate, *Am. J. Clin. Nutr.*, 1977; 30:419-430; Queregaesser, A., et al., Blood changes during training and racing in sled dogs, *J. Nutr.*, 1994; 2760S-2764S.) The increased tissue mass and requirement for gluconeogenic amino acids during exercise necessitate increased protein intake by working dogs. The protein content of the diet may also impact the capacity of the blood to oxygenate tissue and transport energy-containing nutrients needed by working muscles. (Kronfeld, D. S., et al., supra.) Although the protein content of diets used in this study were within the range considered to be normal for healthy dogs, a slight reduction in protein content or amino acid availability may become significant during periods of increased physical activity. Thus the source of dietary protein can affect the balance and availability of amino acids that are needed by exercising tissues.

**[0064]** It is understood by those skilled in the art of animal feeding and diet design that diet formulas are generally not suitable for cross-feeding to other animals, for example, between dogs and cats since different animals can have family or genus specific dietary requirements or prohibitions, such as specific vitamin or mineral needs or intoler-

ance. However, one skilled in the art recognizes these and other requirements or prohibitions and can readily reformulate basic and common nutritional components that can render them suitable for feeding to different animals. Thus the formulations of the present invention while potentially unsuitable for all animals can be readily adapted for use in other animals having similar dietary needs, physical demands, and performance objectives.

**[0065]** The invention will now be further illustrated by the following non-limiting Example(s). The preferred mammalian species are domesticated animals such as dogs or cat.

#### EXAMPLE 1

**[0066]** Year 2—Canine Rectal Temperatures The rectal temperature of each dog was obtained by a licensed veterinarian while the dog was at rest and immediately after a 40 minute hunting session. These measurements were obtained at the end of the Year-2 hunting season (post-season collection). The body temperature of the dogs was similar before hunting regardless of diet (101.7 versus 101.4° F.). The body temperature of all dogs was higher after hunting, but the increase in body temperature was greater for dogs fed the Purina® Pro Plan diet (4.5 versus 3.1° F. increase in rectal temperature). The dogs fed the Purina® Pro Plan diet had significantly higher ( $P < 0.05$ ) body temperatures than those dogs fed the Eukanuba® diet (105.9 versus 104.8° F., a difference of 1.1). Thus the post-hunt body temperature of the dogs fed the Eukanuba® diet was from about 0.5 to about 1.5° F. lower or cooler compared to the Purina® Pro Plan diet. The lower or cooler post-hunt body temperature suggests the dogs expend less energy on waste heat and consequently have greater endurance and greater energy available for hunt-related tasks, such as scouting and pointing. Thus, for example, the body temperature of the hunting mammal fed Eukanuba® diet is maintained to within about 3.0° F. of the pre-hunt body temperature which is significantly lower than hunting mammals fed Purina® Pro Plan diet and as summarized in the accompanying Table.

| Canine Rectal Temperature (° Fahrenheit) at Post-Season Collections |                    |                    |      |
|---|--------------------|--------------------|------|
|   | Eukanuba®          | Purina®            | P(<) |
| Pre-hunt  | 101.7              | 101.4              | NS   |
| Post-hunt   | 104.8 <sup>1</sup> | 105.9 <sup>1</sup> | 0.05 |
| Difference  | 3.1                | 4.5                |      |

<sup>1</sup>Probability or confidence level greater than 95%.

**[0067]** All publications, patents, and patent documents are incorporated by reference herein individually in their entirety. The invention has been described with reference to various specific and preferred embodiments and techniques. However, it should be understood that many variations and modifications may be made while remaining within the spirit and scope of the invention.

What is claimed is:

1. A method for increasing the hunt performance of a hunting mammal which comprises orally administering to the mammal an effective amount of a diet comprising unsaturated fatty acid EPA, unsaturated fatty acid DHA, or both, in a total amount of the diet greater than about 0.20 weight percent.

2. The method of claim 1 wherein the diet further comprises a total fat content from about 20 to about 25 weight percent and greater than about 70 weight percent of the total fat content is unsaturated fat.
3. The method of claim 2 wherein the total fat content has greater than about 75 weight percent unsaturated fat.
4. The method of claim 2 wherein the total fat content has greater than about 85 weight percent unsaturated fat.
5. The method of claim 1 wherein the diet further comprises a total protein content of about 30 to about 35 weight percent, and a total carbohydrate content of about 30 to about 35 weight percent.
6. The method of claim 2 wherein the unsaturated fat is from fish meal, chicken fat, and flax meal.
7. The method of claim 1 wherein the diet is free of beef fat.
8. A method for increasing the heat endurance of a hunting mammal which comprises orally administering to the mammal an effective amount of a diet comprising unsaturated fatty acid EPA, unsaturated fatty acid DHA, or both, in a total amount of the diet greater than about 0.20 weight percent.
9. The method of claim 8 wherein the diet further comprises a total fat content from about 20 to about 25 weight percent and greater than about 70 weight percent of the total fat content is unsaturated fat.
10. The method of claim 9 wherein the total fat content has greater than about 75 weight percent unsaturated fat.
11. The method of claim 9 wherein the total fat content has greater than about 85 weight percent unsaturated fat.
12. The method of claim 8 wherein the diet further comprises a total protein content of about 30 to about 35 weight percent, and a total carbohydrate content of about 30 to about 35 weight percent.
13. The method of claim 9 wherein the unsaturated fat is from fish meal, chicken fat, and flax meal.
14. The method of claim 8 wherein the diet is free of beef fat.
15. A method for maintaining the body temperature of a hunting mammal which comprises orally administering to the mammal an effective amount of a diet comprising unsaturated fatty acid EPA, unsaturated fatty acid DHA, or both, in a total amount of the diet of greater than about 0.20 weight percent.
16. The method of claim 15 wherein the diet further comprises a total fat content from about 20 to about 25 weight percent.
17. The method of claim 16 wherein the total fat content has greater than about 70 weight percent unsaturated fat.
18. The method of claim 16 wherein the total fat content has greater than about 80 weight percent unsaturated fat.
19. The method of claim 15 wherein the diet further comprises a total protein content of about 30 to about 35 weight percent, and a total carbohydrate content of about 30 to about 35 weight percent.
20. The method of claim 17 wherein the unsaturated fat is from fish meal, chicken fat, and flax meal.
21. The method of claim 15 wherein the diet is free of beef fat.
22. The method of claim 15 wherein the hunting mammal has a post-hunt body temperature of within about 3.0° F. of the pre-hunt body temperature.
23. The method of claim 15 wherein the body temperature is the post-hunt rectal temperature in a dog.
24. The method of claim 15 wherein the diet provides greater heat endurance to the hunting mammal during hunting compared to a diet having a lower EPA and DHA total weight percent.
25. The method of claim 15 wherein the hunting mammal is a dog.
26. The method of claim 15 wherein the hunting mammal is an English Pointer.
27. A method for increasing the hunt performance of an English Pointer dog which comprises orally administering to the dog for an effective time and in an effective amount a diet comprising unsaturated fatty acid EPA, unsaturated fatty acid DHA, or both, in a total amount of the diet greater than about 0.20 weight percent.
28. The method of claim 27 wherein the diet further comprises a total fat content from about 20 to about 25 weight percent and greater than about 70 weight percent of the total fat content is unsaturated fat.
29. The method of claim 28 wherein the unsaturated fat content is from fish meal, chicken fat, and flax meal.
30. The method of claim 28 wherein the diet is free of beef fat, beef protein, or both.
31. The method according to claim 27 wherein the effective time is a period of from about 1 to about 24 months.
31. The method according to claim 1 wherein the method provides an increase in target finds in an amount of from about 30 to about 35 percent per hunt session.
32. The method according to claim 1 wherein the method provides an increase in target finds of about 33 percent per hunt session over an entire hunting season.
33. The method of claim 1 wherein the hunt performance is increased by from about 1 to about 2 more target finds per hour compared to a dog fed a diet having a lower weight percent of unsaturated fatty acid EPA, unsaturated fatty acid DHA, or both.
34. The method according to claim 33 wherein the target is an animal or search object.
35. The method according to claim 33 wherein the target is an upland game bird, a swimming game bird, or a shorebird.
36. The method of claim 1 wherein the hunting mammal's body composition is maintained during the hunting season.
37. The method of claim 1 wherein the hunting mammal's appetite is maintained during the hunting season.
38. The method according to claim 1 wherein the hunting mammal's overall hunt performance is increased by greater than about 30 percent.
39. The method according to claim 1 wherein the administering is accomplished by feeding the diet once-a-day during training season, physical conditioning season, or hunting season.
40. The method according to claim 1 wherein a normal blood chemistry profile is maintained in the mammal.
41. The method according to claim 1 wherein the administering uses about  $\frac{2}{3}$  of a cup less food each day to maintain body weight and body condition during hunting season compared to a diet having a lower weight percentage of EPA, DHA, or both.
42. The method according to claim 1 wherein the weight ratio of EPA to DHA in the diet is from about 0.8:1.5 to about 1.5:0.7.
43. The method according to claim 1 wherein the weight ratio of EPA to DHA in the diet is from about 1.0:1.5 to about 1.5:1.0.



44. The method according to claim 1 wherein the diet further comprises the unsaturated fatty acid DPA in an amount of from 0.018 to about 0.034 weight percent based on the total weight of the diet.

45. The method according to claim 8 wherein the diet further comprises the unsaturated fatty acid DPA in an amount of from 0.018 to about 0.034 weight percent based on the total weight of the diet.

46. The method according to claim 8 wherein the diet has unsaturated fatty acids EPA, DPA and DHA in a total amount of from about 0.45 to about 0.60 weight percent.

47. The method according to claim 8 wherein the diet has a total amount of unsaturated fatty acids EPA, DPA and DHA of about 0.50 to about 0.55 weight percent.

48. The method according to claim 15 wherein the diet further comprises the unsaturated fatty acid DPA in an amount of from 0.018 to about 0.034 weight percent based on the total weight of the diet.

49. The method according to claim 27 wherein the diet further comprises the unsaturated fatty acid DPA in an amount of from 0.018 to about 0.034 weight percent based on the total weight of the diet.

50. The method according to claim 1 wherein the total amount of EPA and DHA is from about 0.21 to about 0.30 weight percent.

51. The method according to claim 1 wherein the total amount of EPA and DHA is from about 0.22 to about 0.28 weight percent.

52. The method according to claim 1 wherein the diet further comprises omega-6 fatty acid and omega-3 fatty acid in a weight ratio of about 5:1 to about 10:1.

\* \* \* \* \*



US006297280B1

(12) **United States Patent**  
**Ishihara et al.**

(10) **Patent No.:** **US 6,297,280 B1**  
(45) **Date of Patent:** **Oct. 2, 2001**

(54) **COMPOSITION AND METHOD FOR  
SUPPRESSING BEHAVIOR PROBLEMS OF  
PETS**

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(\*) **Notice:** Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **09/619,713**

(22) **Filed:** **Jul. 19, 2000**

(30) **Foreign Application Priority Data**

Jul. 19, 1999 (JP) ..... 11-204307

(51) **Int. Cl.<sup>7</sup>** ..... **A61K 31/195; A61K 31/20;**  
A61K 31/14

(52) **U.S. Cl.** ..... **514/563; 514/560; 514/642**

(58) **Field of Search** ..... **514/563, 560,**  
514/642

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(57) **ABSTRACT**

A composition for suppressing behavior problems of pets,  
comprising theanine, and optionally one or more compounds  
selected from the group consisting of highly unsaturated  
fatty acids and cholines; and a method of suppressing  
behavior problems of pets, comprising administering the  
above composition to a pet having behavior problems. The  
composition can be effectively used for suppressing various  
behavior problems associated with the pet.

**6 Claims, No Drawings**

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## COMPOSITION AND METHOD FOR SUPPRESSING BEHAVIOR PROBLEMS OF PETS

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to a composition for suppressing behavior problems of pets, and a method for suppressing behavior problems of pets using the same.

#### 2. Discussion of the Related Art

With the popularity of owning a pet and the change of the housing situations of recent years, the method of keeping a pet has been changed. For example, regarding a dog, while it was kept as a watch dog or a hunting dog in the past, it has now been kept indoors as an indoor dog. Similarly, regarding a cat, while it was kept mainly out of the house in the past, it has now been kept mainly indoors. Also, how an owner values a pet has changed: Thinking of a pet as a companion animal that the pet is regarded as a member of family has been infiltrated in the people's mind.

Because of such changes, there arises a new disease, namely behavior problems associated with failure in pet breeding and training for keeping it indoors and also with old age.

For example, regarding the indoor dogs, there have been known to show behaviors such as attack, destruction, inappropriate elimination, licking their paws repeatedly, and excess barking. Also, regarding the cats, there have been known to show behaviors such as inappropriate elimination and scratching.

As a means to suppress these behavior problems, Japanese Patent Laid-Open No. Hei 2-308737 discloses a technique relating to an automatic training device for pets to regulate the behavior automatically such that an animal such as a pet does not go out of a certain area. However, the device has a complicated structure with a defect of complicated operation, and is undesirable from the viewpoint of protecting an animal from harm since a high voltage is applied to a pet which shows abnormal behaviors.

Also, pet owners have been instructed to ignore a dog from about 30 minutes before going out, namely to give no attention for the dog at all, and further to ignore behaviors of the dog such as gladly licking and jumping when the pet owners return home until the dog calms down. However, such a therapeutic method could be easily understood to mean that the pet owner should not have any contact with the dog at all, and when such understanding is made, the symptoms of behavior problems are likely to get rather worse.

Further, there are proposed administration of an anti-anxiety agent, a hormone agent, a tranquilizer, a sedative, an anti-epileptic agent and a pheromone as the pharmacotherapy. However, since there are problems of side effects and stresses of the pet arising from the administration of the pharmaceuticals, these proposals have not yet come into practical use.

Declaw, cutting off the claw of cat, has a problem from the viewpoint of protecting an animal from harm, and therefore is not practiced in most case.

An object of the present invention is to provide a composition for suppressing behavior problems of pets which cannot be effectively solved by the conventional methods, and a method for suppressing behavior problems using it.

The above and other objects of the present invention will be apparent from the following description.

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### SUMMARY OF THE INVENTION

As a result of intense research in view of suppressing the behavior problems of pets, the present inventors have found that a composition comprising a theanine, and optionally further comprising one or more compounds selected from the group consisting of highly unsaturated fatty acids and cholines can suppress the behavior problems of pets, thereby accomplishing the present invention.

Specifically, the present invention is directed to:

- [1] a composition for suppressing behavior problems of pets, comprising theanine;
- [2] a method of suppressing behavior problems of pets, comprising administering the composition of item [1] above to a pet having behavior problems; and
- [3] use of the composition of item [1] above for suppressing behavior problems of pets.

### DETAILED DESCRIPTION OF THE INVENTION

The composition for suppressing behavior problems of pets of the present invention can be used for the purpose of suppressing behavior problems of pets arising from various causes. The desired effects of the composition of the present invention is manifested on the basis of the action of suppressing behavior problems of pets found for the first time for theanine contained in the above composition.

The theanine used in the present invention is a kind of an amino acid, and is a water-soluble white crystalline powder.

Methods for preparing theanine used in the present invention may be any of known methods. Examples thereof include a method of extracting it from tea-leaves; a method of preparing it by an organic synthesis reaction [*Chem. Pharm. Bull.*, 19(7), 1301-1307 (1971)]; a method of preparing it by treating a mixture of glutamine and ethylamine with glutaminase (Japanese Examined Patent Publication No. Hei 7-55154); a method comprising culturing culture cells of tea in a medium containing ethylamine, and promoting proliferation of the culture cells, with increasing an dosage of accumulated theanine in the culture cells (Japanese Patent Laid-Open No. Hei 5-123166); and a modification method of one disclosed in Japanese Examined Patent Publication No. Hei 7-55154 and Japanese Patent Laid-Open No. Hei 5-123166 using an ethylamine derivative, such as ethylamine hydrochloride, in place of ethylamine. The term "tea-leaves" as used herein refers to green tea, oolong tea, black tea, and the like. The theanine obtained by the methods described above may be of any of L-form, D-form and DL-form, among which the L-form is preferred in the present invention, because it is approved as a food additive, and it is economically utilizable. In addition, the theanine used in the present invention may be of any forms, such as purified products, crudely purified products, extracts and commercialized products [trade names: "SUNTHEANINE" and "TEAPECUS" commercially available from Taiyo Kagaku Co., Ltd.].

From the viewpoint of enhancing an action of suppressing behavior problems of pets owned by theanine, it is preferable that the composition of the present invention further comprises one or more compounds selected from highly unsaturated fatty acids and cholines. Although the function mechanism is not clarified, the compound can act to enhance the action of suppressing behavior problems owned by theanine. Therefore, the same level of effects as that exhibited with theanine alone can be obtained, with a smaller dosage of theanine required as compared to the case where theanine is used alone by the copresence of the compound.

The term "highly unsaturated fatty acid" in the present invention refers to unsaturated fatty acids having 18 or more carbon atoms such as linoleic acid,  $\gamma$ -linolenic acid, dihomo- $\gamma$ -linolenic acid, arachidonic acid,  $\alpha$ -linolenic acid, eicosa-pentaenoic acid (EPA) and docosahexaenoic acid (DHA), among which arachidonic acid and DHA are preferable, from the viewpoint of effectively enhancing an action of suppressing behavior problems of pets owned by theanine, and DHA is more preferable.

The supplying form of the highly unsaturated fatty acid used in the composition of the present invention includes, but not particularly limited to, fats and oils containing the fatty acid and purified products of the fatty acid. In addition, for the purpose of stabilizing the fatty acid, the highly unsaturated fatty acid can be used in a combination of a functional protein preparation disclosed in Japanese Patent Laid-Open No. Hei 9-9878, to give powdery fats and oils.

Concrete examples of the forms of the highly unsaturated fatty acid are disclosed, for instance, as follows. When the highly unsaturated fatty acid is DHA, it can be in the form of DHA powdery oils and fats ["Kinoseiyushi no Funmatsu Anteika" (Stabilization by Making Powdery Form of Functional Fats and Oils), "Dai 53 Kai Nihon Eiyo Shokuryo Gakkai Koen Yoshishu" (Summary of 53rd Academic Meeting for Japanese Society of Nutrition and Food Science), p. 134 3C-02a, 1999], prepared by making the DHA powdery form with egg yolk protein. When the highly unsaturated fatty acid is arachidonic acid, it can be in the form of egg yolk oil [*Japan Food Science* 38 (1), p.31-39 (1999)].

Choline used for the composition of the present invention refers to trimethyl- $\beta$ -hydroxyethyl ammonium, and it can be in the form of organic cholines, choline salts and free cholines. As the organic cholines, there can be exemplified phosphatidylcholine. As the choline salts, there can be exemplified choline chloride. In the case of phosphatidylcholine, it can be phospholipids derived from eggs or soybeans. Among them, from the same viewpoints as the case of the highly unsaturated fatty acid, phosphatidylcholine is preferable.

The pet in the present invention refers to an animal which humans keep for the fondling purpose, and concretely includes dogs, cats, rabbits, hamsters, guinea pigs, rats, mice, parakeets, parrots, *Lonchura striatas* and the like. The dogs and cats are preferable for the use of the composition of the present invention, from the viewpoint of the frequency of the behavior problems, and the dogs are most preferable. In addition, as the dogs, indoor dogs and aged dogs are preferable, from the viewpoint of effectively suppressing behavior problems indoors and the like.

Although a detailed cause-and-effect relationship is not yet clarified, the behavior problems in the present invention include behaviors caused by or associated with, for instance, separation anxiety, sociopathy, neurological disorders producing abnormal behavior, abnormal urine marking, heatstroke, dysautonomia, kinesia and dementia. Concrete examples thereof include conditions and behaviors such as attack, destruction, inappropriate elimination, licking its paw repeatedly, excess barking, scratching, cryptogenic astasia, shivering, astasia, spray, reduced blood pressure, abnormal appetat associated with adynamia (overeating and the like), aberrant motor behavior (excess sleeping, reversal of night and day, and the like), dysbasia (trudging, walking in a given direction and the like), abnormal elimination behavior Incontinence, housesoiling and the like), abnormal sense (decline of auditory sense, decline of olfactory sense, and the like), abnormal posture (hanging down of

head and tail, abnormal posture and the like), abnormal vocalizing (monotonous and loud voice, barking in the midnight or against the abnormal subject and the like), loss of feeling (decline of body language, loss of body language and the like), loss of interrelation (loss of interrelation with other humans or other animals, loss of interrelation with the pet owner and the like) and abnormal situation judgment and the like. The composition of the present invention can be especially suitably used for suppression of behavior problems such as attack, destruction, inappropriate elimination, excess barking, aberrant motor behavior, dysbasia, reduced blood pressure, shivering, cryptogenic astasia, abnormal vocalizing, astasia, and spray.

The process for preparing the composition of the present invention is not particularly limited, as long as the composition can comprise theanine, and preferably theanine and one or more compounds selected from the group consisting of highly unsaturated fatty acids and cholines. Other ingredients constituting the composition of the present invention are not particularly limited as long as they do not impair the action of suppressing behavior problems owned by theanine.

The content of theanine in the composition of the present invention is not particularly limited. The content of theanine is preferably 0.00025 to 100% by weight. In the case where the composition of the present invention comprises both theanine and the above compound, it is preferable that the content of theanine is 0.05 to 20% by weight, and that a total content of the compounds is 50 to 99% by weight.

The method for administration of the composition of the present invention is not particularly limited, and is preferably oral administration or administration by injection, especially preferably oral administration. In case of the oral administration, a concrete method thereof includes a method comprising adding the composition to a pet food; a method comprising dissolving the composition in an electrolytic solution; a method comprising adding the composition to drinking water, and the like. Also, the composition may be administered together with a conventionally used pharmaceutical.

The timing of administration of the composition of the present invention is not particularly limited. When the composition is administered to a pet before the pet remarkably exhibits behavior problems, the prophylactic effect can be expected. On the other hand, when the composition is administered to a pet while the pet exhibits behavior problems, the behavior problems can be suppressed effectively. In addition, the period of administration of the composition of the present invention is not particularly limited.

As for the dosage of the composition in the present invention, it is not required to particularly consider age, sexual differences, and the like of pets. Here, the dosage of the composition shown below is "per administration." In an embodiment where theanine is used alone for the composition, the composition is used such that the dosage of theanine is preferably 0.05 to 100 mg, more preferably 0.07 to 80 mg, especially preferably 0.09 to 60 mg, per one kilogram of the body weight of the pet. It is preferable that the dosage of theanine is 0.05 mg or more, per one kilogram of the body weight of the pet, from the viewpoint of obtaining excellent suppressive effect on the behavior problems, and that the dosage is 100 mg or less, per one kilogram of the body weight of the pet, from the viewpoint of costs.

In addition, in an embodiment where the composition comprises theanine and one or more compounds selected

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from the group consisting of highly unsaturated fatty acids and cholines, the composition is used such that the dosage of theanine is preferably 0.02 to 20 mg, more preferably 0.05 to 10 mg, especially preferably 0.07 to 5 mg, per one kilogram of the body weight of the pet, and that the total dosage of compounds other than theanine is preferably 0.2 to 80 mg, more preferably 0.5 to 65 mg, especially preferably 1 to 50 mg, per one kilogram of the body weight of the pet. Thus, the composition is used such that the total dosage of whole ingredients contained in the composition is preferably 0.22 to 80 mg, more preferably 0.55 to 75 mg, especially preferably 1.07 to 55 mg, per one kilogram of the body weight of the pet. It is preferable that the total dosage of the whole ingredients is 0.22 mg or more, per one kilogram of the body weight of the pet, from the viewpoint of obtaining excellent suppressive effect on behavior problems, and that the total dosage is 100 mg or less, per one kilogram of the body weight of the pet, from the viewpoint of costs.

## EXAMPLES

The present invention will be described in more detail hereinbelow by means of the working examples, without intending to particularly restrict the present invention thereto.

## Example 1

There were reacted 0.3 M glutamine and 1.5 M ethylamine at 30° C. for 22 hours in borate buffer ( $\text{Na}_2\text{B}_4\text{O}_7$ -NaOH, pH 11) with 0.3 U glutaminase. Glutamic acid, a by-product, was 20 nmol. The purification for the reaction mixture was carried out by applying the reaction mixture to Dowex 50x8 and Dowex 1x2 column chromatography, and eluted with ethanol. From the fact that the isolated substance exhibited the same Rf value as standard substance of theanine when subjected to amino acid analyzer and paper chromatography, the isolated substance from the reaction mixture was theanine. When the isolated substance was hydrolyzed with hydrochloric acid or glutaminase, glutamic acid and ethylamine was formed in a 1:1 proportion by mole. Since the isolated substance was hydrolyzed with glutaminase, it was shown that ethylamine was bound to  $\gamma$ -position of glutamic acid. In addition, it was confirmed with glutamate dehydrogenase that glutamic acid obtained by hydrolysis had an L-form. Finally, the resulting compound was confirmed to be L-theanine. The theanine was used in the subsequent Test Examples.

## Example 2

An electrolytic beverage for pets having a composition listed as Example 2 of Table 1 was prepared.

TABLE 1

|                                | Ex. 2  | Ex. 3  | Ex. 4  | Comp.<br>Ex. 1 |
|--------------------------------|--------|--------|--------|----------------|
| Glucose                        | 4.32 g | 4.32 g | 4.32 g | 4.32 g         |
| Glycine                        | 1.80 g | 1.80 g | 1.80 g | 1.80 g         |
| Sodium Citrate                 | 1.57 g | 1.57 g | 1.57 g | 1.57 g         |
| Sodium Chloride                | 1.40 g | 1.40 g | 1.40 g | 1.40 g         |
| Potassium Chloride             | 0.45 g | 0.45 g | 0.45 g | 0.45 g         |
| Theanine Prepared in Example 1 | 4.13 g | 0.55 g | 0.22 g | —              |
| Water                          | 200 ml | 200 ml | 200 ml | 200 ml         |

## Example 3

An electrolytic beverage for pets having a composition listed as Example 3 of Table 1 was prepared.

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## Example 4

An electrolytic beverage for pets having a composition listed as Example 4 of Table 1 was prepared.

## Comparative Example 1

An electrolytic beverage for pets having a composition listed as Comparative Example 1 of Table 1 was prepared.

## Test Example 1

Nine indoor dogs (average age: 1.5 years, average weight: 4.6 kg) exhibiting abnormal barking (aggressive behavior) to the pet owner and destructive behavior of damaging chairs and sofa after the pet owner went out as behavior problems were subjected to a test for suppressing the behavior problems. Each of these 9 indoor dogs was designated "A" to "I," and subjected to the test. Each of the indoor dogs "A" to "H" was administered with a commercially available pet food supplemented with the following components:

"A": 3.8 mg/day of the theanine prepared in Example 1;

"B": 2 mg/day of the theanine prepared in Example 1 and 100 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%);

"C": 2 mg/day of the theanine prepared in Example 1 and 300 mg/day of egg yolk oil preparation ("Yolk Oil L-301," commercially available from Taiyo Kagaku Co., Ltd., arachidonic acid content: 1.6%);

"D": 2 mg/day of the theanine prepared in Example 1 and 25 mg/day of egg yolk lecithin preparation ("Yolk Oil MAC-30," commercially available from Taiyo Kagaku Co., Ltd., phosphatidylcholine content: 20%);

"E": 0.2 mg/day of the theanine prepared in Example 1;

"F": 500 mg/day of the theanine prepared in Example 1;

"G": 0.09 mg/day of the theanine prepared in Example 1 and 18 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%); and

"H": 95 mg/day of the theanine prepared in Example 1 and 7.3 g/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%).

"I" was given only the commercially available pet food.

The extent of suppression of the behavior problems was compared with that before administration of the composition of the present invention. The extent of suppression was numerically indicated as shown in Table 2, and recorded. The results are shown in Table 3.

TABLE 2

|                    |   |
|--------------------|---|
| No Change          | 0 |
| Slight Suppression | 1 |
| Marked Suppression | 2 |
| Cured              | 3 |

TABLE 3

|   | Day 1 | Day 3 | Day 5 | Day 7 |
|---|-------|-------|-------|-------|
| A | 1     | 2     | 2     | 3     |
| B | 2     | 3     | 3     | 3     |
| C | 2     | 3     | 3     | 3     |
| D | 2     | 3     | 3     | 3     |
| E | 0     | 0     | 1     | 1     |
| F | 1     | 2     | 3     | 3     |
| G | 0     | 1     | 1     | 2     |

TABLE 3-continued

|   | Day 1 | Day 3 | Day 5 | Day 7 |
|---|-------|-------|-------|-------|
| H | 2     | 3     | 3     | 3     |
| I | 0     | 0     | 0     | 0     |

As shown in Table 3, the behavior problems of the indoor dogs each of which was administered with the composition of the present invention were suppressed from Day 1 of administration, except for "E" and "G." Also, a suppressive effect on the behavior problems was recognized in the indoor dogs "I" and "H" which were administered with a large amount of the composition, but only to an extent equivalent to those of "A" to "D."

In addition, when the indoor dog "A" was compared with the indoor dogs "B" and "C," more effective suppressive effect on the behavior problems was recognized in the indoor dogs "B" and "C."

On the other hand, some suppressive effects on the behavior problems were recognized in the indoor dogs "E" and "G" which were administered with a small amount of the composition, but somewhat smaller.

In contrast, however, no suppressive effect on the behavior problems was recognized in the indoor dog "I," which was given only the pet food.

#### Test Example 2

Nine cats which were castrated or subjected to contraception (5 castrated cats, 4 cats subjected to contraception, average age: 1.2 years, average weight: 3.8 kg) exhibiting behavior problems associated with abnormal urine marking (e.g. spray) were subjected to a test for suppressing the behavior problems. Each of these 9 cats was designated "AA" to "II," and subjected to the test. Each of the cats "AA" to "HH" was administered with a commercially available cat food supplemented with the following components:

"AA": 3.2 mg/day of the theanine prepared in Example 1;

"BB": 1.7 mg/day of the theanine prepared in Example 1 and 83 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%);

"CC": 1.7 mg/day of the theanine prepared in Example 1 and 250 mg/day of egg yolk oil preparation ("Yolk Oil L-301," commercially available from Taiyo Kagaku Co., Ltd., arachidonic acid content: 1.6%);

"DD": 1.7 mg/day of the theanine prepared in Example 1 and 21 mg/day of egg yolk lecithin preparation ("Yolk Oil MAC-30," commercially available from Taiyo Kagaku Co., Ltd., phosphatidylcholine content: 20%);

"EE": 0.17 mg/day of the theanine prepared in Example 1;

"FF": 415 mg/day of the theanine prepared in Example 1;

"GG": 0.07 mg/day of the theanine prepared in Example 1 and 15 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%); and

"HH": 79 mg/day of the theanine prepared in Example 1 and 6 g/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%).

"II" was given only the commercially available cat food.

The extent of suppression of the behavior problems was compared with that before administration of the composition of the present invention. The extent of suppression was numerically indicated as shown in Table 2, and recorded. The results are shown in Table 4.

TABLE 4

|    | Day 1 | Day 3 | Day 5 | Day 7 |
|----|-------|-------|-------|-------|
| AA | 1     | 1     | 2     | 2     |
| BB | 2     | 3     | 3     | 3     |
| CC | 2     | 3     | 3     | 3     |
| DD | 2     | 3     | 3     | 3     |
| EE | 0     | 0     | 1     | 1     |
| FF | 1     | 1     | 2     | 2     |
| GG | 0     | 1     | 1     | 2     |
| HH | 2     | 3     | 3     | 3     |
| II | 0     | 0     | 0     | 0     |

As shown in Table 4, the behavior problems of the cats each of which was administered with the composition of the present invention were suppressed from Day 1 of administration, except for "EE" and "GG." Also, a suppressive effect on the behavior problems was recognized in the cats "FF" and "HH" which were administered with a large amount of the composition, but only to an extent equivalent to those of "AA" to "DD."

In addition, when the cat "AA" was compared with the cats "BB" and "CC," more effective suppressive effect on the behavior problems was recognized in the cats "BB" and "CC."

On the other hand, some suppressive effects on the behavior problems were recognized in the cats "EE" and "GG" which were administered with a small amount of the composition, but somewhat smaller.

In contrast, however, no suppressive effect on the behavior problems was recognized in the cat "II," which was given only the cat food.

#### Test Example 3

Nine indoor dogs (average age: 1.7 years, average weight: 4.8 kg) with heatstroke were subjected to a test for suppressing the behavior problems associated with heatstroke (e.g., reduced blood pressure, shivering, cryptogenic astasia). Each of these 9 indoor dogs was designated "AAA" to "IIII," and subjected to the test. Each of the indoor dogs "AAA" to "IIII" was administered with a commercially available pet food supplemented with the following components:

"AAA": 4 mg/day of the theanine prepared in Example 1;

"BBB": 2.2 mg/day of the theanine prepared in Example 1 and 110 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%);

"CCC": 2.2 mg/day of the theanine prepared in Example 1 and 320 mg/day of egg yolk oil preparation ("Yolk Oil L-301," commercially available from Taiyo Kagaku Co., Ltd., arachidonic acid content: 1.6%);

"DDD": 2.2 mg/day of the theanine prepared in Example 1 and 27 mg/day of egg yolk lecithin preparation ("Yolk Oil MAC-30," commercially available from Taiyo Kagaku Co., Ltd., phosphatidylcholine content: 20%);

"EEE": 0.3 mg/day of the theanine prepared in Example 1;

"FFF": 530 mg/day of the theanine prepared in Example 1;

"GGG": 0.1 mg/day of the theanine prepared in Example 1 and 20 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%); and

"IIII": 100 mg/day of the theanine prepared in Example 1 and 7.7 g/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%).

"III" was given only the commercially available pet food.

The extent of suppression of the behavior problems was compared with that before administration of the composition of the present invention. The extent of suppression was numerically indicated as shown in Table 2, and recorded. The results are shown in Table 5.

TABLE 5

|     | Day 1 | Day 3 | Day 5 | Day 7 |
|-----|-------|-------|-------|-------|
| AAA | 1     | 1     | 2     | 2     |
| BBB | 2     | 3     | 3     | 3     |
| CCC | 2     | 3     | 3     | 3     |
| DDD | 2     | 3     | 3     | 3     |
| EEE | 0     | 1     | 1     | 1     |
| FFF | 1     | 1     | 2     | 2     |
| GGG | 0     | 1     | 1     | 2     |
| HHH | 2     | 3     | 3     | 3     |
| III | 0     | 0     | 0     | 0     |

As shown in Table 5, the behavior problems of the indoor dogs each of which was administered with the composition of the present invention were suppressed from Day 1 of administration, except for "EEE" and "GGG." Also, a suppressive effect on the behavior problems was recognized in the indoor dogs "FFF" and "HHH" which were administered with a large amount of the composition, but only to an extent equivalent to those of "AAA" to "DDD."

In addition, when the indoor dog "AAA" was compared with the indoor dogs "BBB" and "CCC," more effective suppressive effect on the behavior problems was recognized in the indoor dogs "BBB" and "CCC."

On the other hand, some suppressive effects on the behavior problems were recognized in the indoor dogs "EEE" and "GGG" which were administered with a small amount of the composition, but somewhat smaller.

In contrast, however, no suppressive effect on the behavior problems was recognized in the indoor dog "III," which was given only the pet food.

#### Test Example 4

Nine indoor dogs (average age: 1.7 years, average weight: 4.8 kg) exhibiting behavior problems associated with kinesia (e.g. reduced blood pressure, astasia, shivering, dysbasia) by riding on the car with the pet owner and being brought to a pet clinic were subjected to a test for suppressing the behavior problems. Each of these 9 indoor dogs exhibited exhausted symptom when arrived to the pet clinic. Each of these 9 indoor dogs was designated "J" to "R," and subjected to the test. Each of the indoor dogs "J" to "Q" was forcibly orally administered with the following components:

"J": 4 mg/day of the theanine prepared in Example 1;

"K": 2.2 mg/day of the theanine prepared in Example 1 and 110 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%);

"L": 2.2 mg/day of the theanine prepared in Example 1 and 320 mg/day of egg yolk oil preparation ("Yolk Oil L-301," commercially available from Taiyo Kagaku Co., Ltd., arachidonic acid content: 1.6%);

"M": 2.2 mg/day of the theanine prepared in Example 1 and 27 mg/day of egg yolk lecithin preparation ("Yolk Oil MAC-30," commercially available from Taiyo Kagaku Co., Ltd., phosphatidylcholine content: 20%);

"N": 0.3 mg/day of the theanine prepared in Example 1;

"O": 530 mg/day of the theanine prepared in Example 1;

"P": 0.1 mg/day of the theanine prepared in Example 1 and 20 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%); and

"Q": 100 mg/day of the theanine prepared in Example 1 and 7.7 g/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%).

"R" was given only the commercially available pet food.

The extent of suppression of the behavior problems was compared with that before administration of the composition of the present invention. The extent of suppression was numerically indicated as shown in Table 2, and recorded.

The results are shown in Table 6.

TABLE 6

|   | Hour 1 | Hour 3 | Hour 5 | Hour 7 |
|---|--------|--------|--------|--------|
| J | 1      | 1      | 2      | 3      |
| K | 3      | 3      | 3      | 3      |
| L | 3      | 3      | 3      | 3      |
| M | 3      | 3      | 3      | 3      |
| N | 0      | 0      | 1      | 1      |
| O | 1      | 1      | 2      | 3      |
| P | 1      | 1      | 1      | 2      |
| Q | 3      | 3      | 3      | 3      |
| R | 0      | 0      | 0      | 0      |

As shown in Table 6, the behavior problems of the indoor dogs each of which was administered with the composition of the present invention were suppressed from Hour 1 of administration, except for "N." Also, a suppressive effect on the behavior problems was recognized in the indoor dogs "O" and "Q" which were administered with a large amount of the composition, but only to an extent equivalent to those of "J" to "M."

In addition, when the indoor dog "J" was compared with the indoor dogs "K" and "L," more effective suppressive effect on the behavior problems was recognized in the indoor dogs "K" and "L."

On the other hand, some suppressive effects on the behavior problems were recognized in the indoor dogs "N" and "P" which were administered with a small amount of the composition, but somewhat smaller.

In contrast, however, no suppressive effect on the behavior problems was recognized in the indoor dog "R," which was given only the pet food.

#### Test Example 5

Nine aged dogs (average age: 10.4 years, average weight: 5.5 kg) being diagnosed to have dementia and exhibiting behavior problems associated with dementia (e.g. attack, destruction, inappropriate elimination, excess barking, aberrant motor behavior, abnormal vocalizing, dysbasia) were subjected to a test for suppressing the behavior problems. Each of these 9 aged dogs was designated "JJ" to "RR," and subjected to the test. Each of the aged dogs "JJ" to "QQ" was administered with a commercially available pet food supplemented with the following components:

"JJ": 4.6 mg/day of the theanine prepared in Example 1;

"KK": 2.6 mg/day of the theanine prepared in Example 1 and 130 mg/day of DHA-containing fats and oils powder (commercially available from Taiyo Kagaku Co., Ltd., "Sun Coat DY-5," DHA content: 5.0%);

"LL": 2.6 mg/day of the theanine prepared in Example 1 and 370 mg/day of egg yolk oil preparation ("Yolk Oil L-301," commercially available from Taiyo Kagaku Co., Ltd., arachidonic acid content: 1.6%);

"MM": 2.6 mg/day of the theanine prepared in Example 1 and 32 mg/day of egg yolk lecithin preparation ("Yolk Oil MAC-30," commercially available from Taiyo Kagaku Co., Ltd., phosphatidylcholine content: 20%);

"NN": 0.4 mg/day of the theanine prepared in Example 1;  
 "OO": 610 mg/day of the theanine prepared in Example 1;  
 "PP": 0.2 mg/day of the theanine prepared in Example 1 and  
 25 mg/day of DHA-containing fats and oils powder  
 (commercially available from Taiyo Kagaku Co., Ltd.,  
 "Sun Coat DY-5," DHA content: 5.0%); and  
 "QQ": 115 mg/day of the theanine prepared in Example 1  
 and 8.8 g/day of DHA-containing fats and oils powder  
 (commercially available from Taiyo Kagaku Co., Ltd.,  
 "Sun Coat DY-5," DHA content: 5.0%).  
 "RR" was given only the commercially available pet  
 food.

The extent of suppression of the behavior problems was  
 compared with that before administration of the composition  
 of the present invention. The extent of suppression was  
 numerically indicated as shown in Table 2, and recorded.  
 The results are shown in Table 7.

TABLE 7

|    | Day 1 | Week 1 | Week 5 | Week 10 |
|----|-------|--------|--------|---------|
| JJ | 1     | 1      | 1      | 1       |
| KK | 1     | 1      | 2      | 2       |
| LL | 1     | 1      | 2      | 2       |
| MM | 1     | 1      | 2      | 3       |
| NN | 0     | 0      | 1      | 1       |
| OO | 1     | 1      | 1      | 1       |
| PP | 0     | 1      | 1      | 2       |
| QQ | 1     | 1      | 2      | 2       |
| RR | 0     | 0      | 0      | 0       |

As shown in Table 7, the behavior problems of the aged  
 dogs each of which was administered with the composition  
 of the present invention were gradually suppressed from  
 Day 1 of administration, except for "NN" and "PP." Also, a  
 suppressive effect on the behavior problems was recognized  
 in the aged dogs "OO" and "QQ" which were administered  
 with a large amount of the composition, but only to an extent  
 equivalent to those of "JJ" to "MM."

In addition, when the aged dog "JJ" was compared with  
 the aged dogs "KK" and "LL," more effective suppressive  
 effect on the behavior problems was recognized in the aged  
 dogs "KK" and "LL."

On the other hand, some suppressive effects on the  
 behavior problems were recognized in the aged dogs "NN"  
 and "PP" which were administered with a small amount of  
 the composition, but somewhat smaller.

In contrast, however, no suppressive effect on the behav-  
 ior problems was recognized in the aged dog "RR," which  
 was given only the pet food.

## Test Example 6

Four indoor dogs (average age: 1.4 years, average weight:  
 5.1 kg) exhibiting abnormal barking (aggressive behavior)  
 to the pet owner and destructive behavior of damaging  
 chairs and sofa after the pet owner went out as behavior  
 problems were subjected to a test for suppressing the behav-  
 ior problems. Each of these 4 indoor dogs was designated  
 "a" to "d," and subjected to the test. Each of the indoor dogs  
 "a" to "d" was administered with the following:

"a": 200 ml/day of the electrolytic beverage for pets pre-  
 pared in Example 2;  
 "b": 200 ml/day of the electrolytic beverage for pets pre-  
 pared in Example 3;  
 "c": 200 ml/day of the electrolytic beverage for pets pre-  
 pared in Example 4; and  
 "d": 200 ml/day of the electrolytic beverage for pets pre-  
 pared in Comparative Example 1.

The extent of suppression of the behavior problems was  
 compared with that before administration of the electrolytic  
 beverage for pets comprising the composition of the present  
 invention. The extent of suppression was numerically indi-  
 cated as shown in Table 2, and recorded. The results are  
 shown in Table 8.

TABLE 8

|   | Day 1 | Day 3 | Day 5 | Day 7 |
|---|-------|-------|-------|-------|
| a | 1     | 1     | 2     | 3     |
| b | 1     | 1     | 2     | 3     |
| c | 0     | 1     | 1     | 1     |
| d | 0     | 0     | 0     | 0     |

As shown in Table 8, the behavior problems of the indoor  
 dog "a" which was administered with the electrolytic bev-  
 erage for pets prepared in Example 2 were suppressed from  
 Day 1 of administration. Also, a suppressive effect on the  
 behavior problems was recognized in the indoor dog "b"  
 which was administered with the electrolytic beverage for  
 pets prepared in Example 3, but only to an extent equivalent  
 to those of "a."

On the other hand, some suppressive effects on the  
 behavior problems were recognized in the indoor dog "c"  
 which was administered with the electrolytic beverage for  
 pets prepared in Example 4, but somewhat smaller.

In contrast, however, no suppressive effect on the behav-  
 ior problems was recognized in the indoor dog "d," which  
 was administered with the electrolytic beverage for pets  
 prepared in Comparative Example 1.

## Test Example 7

Four indoor dogs (average age: 1.8 years, average weight:  
 5.1 kg) exhibiting behavior problems associated with kinesia  
 by riding on the car with the pet owner and being brought to  
 a pet clinic were subjected to a test for suppressing the  
 behavior problems. Each of these 4 indoor dogs exhibited  
 exhausted symptom when arrived to the pet clinic. Each of  
 these 4 indoor dogs was designated "aa" to "dd," and  
 subjected to the test. Each of the indoor dogs "aa" to "dd"  
 was administered with the following:

"aa": 200 ml/day of the electrolytic beverage for pets  
 prepared in Example 2;  
 "bb": 200 ml/day of the electrolytic beverage for pets  
 prepared in Example 3;  
 "cc": 200 ml/day of the electrolytic beverage for pets  
 prepared in Example 4; and  
 "dd": 200 ml/day of the electrolytic beverage for pets  
 prepared in Comparative Example 1.

The extent of suppression of the behavior problems was  
 compared with that before administration of the electrolytic  
 beverage for pets comprising the composition of the present  
 invention. The extent of suppression was numerically indi-  
 cated as shown in Table 2, and recorded. The results are  
 shown in Table 9.

TABLE 9

|    | Hour 3 | Hour 6 | Hour 12 | Hour 24 |
|----|--------|--------|---------|---------|
| aa | 1      | 1      | 2       | 3       |
| bb | 1      | 1      | 2       | 3       |
| cc | 0      | 0      | 1       | 2       |
| dd | 0      | 0      | 0       | 0       |

As shown in Table 9, the behavior problems of the indoor  
 dog "aa" which was administered with the electrolytic



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beverage for pets prepared in Example 2 were suppressed from Hour 1 of administration. Also, a suppressive effect on the behavior problems was recognized in the indoor dog "bb" which was administered with the electrolytic beverage for pets prepared in Example 3, but only to an extent equivalent to those of "aa."

On the other hand, some suppressive effects on the behavior problems were recognized in the indoor dog "cc" which was administered with the electrolytic beverage for pets prepared in Example 4, but somewhat smaller.

In contrast, however, no suppressive effect on the behavior problems was recognized in the indoor dog "dd," which was administered with the electrolytic beverage for pets prepared in Comparative Example 1.

Since the composition for suppressing behavior problems of pets, which is an inventive product, can be administered in the form supplemented to usually used pet foods and electrolytic beverages, the composition can be used very highly conveniently, and is also free from problems concerning protecting an animal from harm, thereby giving significant effects. In addition, no harmful action to pets such as side effects is recognized, in contrary to conventionally used pharmaceuticals.

Thus, the present invention greatly contributes not only to pet industries but also to solving problems concerning protecting an animal from harm.

#### EQUIVALENT

The present invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

What is claimed is:

1. A composition for suppressing behavior problems of pets, comprising theanine, and one or more compounds

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selected from the group consisting of cholines, arachidonic acid, eicoapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

2. A method of suppressing behavior problems in pets, comprising administering to a pet having behavior problems a composition comprising theanine, and one or more compounds selected from the group consisting of cholines, arachidonic acid, eicoapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

3. The method according to claim 2, wherein the composition is used such that the dosage of theanine per administration is 0.05 to 100 mg, per one kilogram of the body weight of the pet.

4. The method according to claim 2, wherein the composition is used such that the dosage of theanine per administration is 0.02 to 20 mg, per one kilogram of the body weight of the pet, and the total dosage of said one or more compounds selected from the group consisting of cholines, arachidonic acid, eicoapentaenoic acid (EPA) and docosahexaenoic acid (DHA) per administration is 0.2 to 80 mg, per one kilogram of the body weight of the pet.

5. The method according to claim 2, wherein the pet is at least one animal selected from the group consisting of dogs, cats, rabbits, hamsters, guinea pigs, rats, mice, parakeets, parrots and Lonchura striates.

6. The method according to claim 2, wherein at least one behavior problem is suppressed, said behavior problem selected from the group consisting of attack, destruction, inappropriate elimination, licking its paw repeatedly, scratching, cryptogenic astasia, shivering, astasia, spray, reduced blood pressure, abnormal appetite associated with adynamia, aberrant motor behavior, dysbasia, abnormal sense, abnormal posture, abnormal vocalizing, loss of feeling, loss of interrelation and abnormal situation judgment.

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